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ABSTRACT

Presents a proposed technology plan for Foothill-De Anza Community College district. The plan begins by outlining the college's proposed plan of action, which addresses four areas: the district's information infrastructure, faculty, administration, and student use of technology. The report then addresses issues related to technology in the district, including: providing the technology, the role of libraries and technology, distance learning, the TV centers and technology, the telephone system, the role of the world wide web, and policies related to technology. The third section of the plan reveals the issues in providing the services which include; centralization vs. decentralization, the structure of the support organization, staffing, and the philosophy of an information technology support organization. Recommendations are provided to address each of the issues. The report describes possible implementation concerns, such as approximate costs, staffing costs, hardware costs, infrastructure costs and recommends a proposed calendar. The conclusion further provides suggestions to put this plan into action. (MDP)

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Proposed Technology Plan

for

Foothill - De Anza Community College District

submitted by

Penny Patz, Dean of Instruction and Technology, Foothill College
William Pritchard, Dean of Technology, De Anza College

June 4, 1996

J O'Bergh

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Prologue

In December, 1995, Chancellor Leo Chavez instructed William Pritchard, Dean of Technology at De Anza College, and Penny Patz, Dean of Instruction and Technology at Foothill College, to develop a technology plan for the Foothill-De Anza Community College District. For a period of approximately six months, we have labored on the plan, meeting with dozens of people on both campuses and at the district office. This document is the result.

Although fairly comprehensive, this proposed plan is not meant to be the final "definitive" plan for the district. Instead, this is a document that contains the best attempt by two individuals, although in consultation with others, to suggest a plan for technology. The recommendations in this document are based on what we feel makes sense from a technology viewpoint and from the viewpoint of implementing technology. There are certainly many other ways to look at a plan; therefore, other viewpoints will also need to be represented.

Naturally it is the hope of all authors that their writing is whole-heartedly endorsed by all and any suggestions for action are so well reasoned they are unanimously accepted and implemented without question. However, we fully recognize any plan for technology, which will touch virtually all aspects of the district, will not meet such a fate. Therefore, we present this plan with

the recognition that there will be considerable discussion and debate and feel it is important this widespread discussion occur as we implement technology throughout the district. We are presenting this document as a preliminary list of issues and concerns with suggested actions so that a district-wide technology committee can elaborate upon and propose technology related policies and procedures.

This discussion, however, should not unduly delay implementation. The district has much work to do to meet the technological demands of our educational mission. Technology changes quickly; to delay action may jeopardize our ability to provide quality service and instruction to our students and faculty. And at a time when finances are uncertain, it is equally important to begin implementation when the resources are available to support the plan. Even if many items in this plan are questioned, discussed, and debated, it is crucial that we move forward. In our opinion, a failure to begin action as soon as possible because of extended discussion and debate would be a far greater error than to delay implementation.

It is our belief that appropriate use of technology can provide great benefit including the district's day-to-day administrative operation and internal communications as well as instructional uses. However, it is also our belief that technology should not be the driving force for decision- and policy-making in the District. Instead, our educational mission and educational plan should drive our use of technology. We hope this document reflects that bias.

We also recognize with the rapid changes in technology any plan is subject to rapid obsolescence. Although we attempt to make recommendations for that inevitability, we also recognize that within a relatively short period of time many of our recommendations may seem antiquated and dated. Therefore we recommend this plan be revisited within at least two years, perhaps even annually.

William Pritchard
Penny Patz

Introduction

The nature of education in today's world is changing. Historically, for over two thousand years, information and education were passed on in two ways orally and through the written word. For much of this time, these processes served the world well. However, with the in-crease in knowledge and the rapid increases in the volume of the written word, it is no longer possible for an educational institution fixed in time and location to serve the educational needs of its students if it follows only the traditional methods of education.

It is important to note that from the beginning of the written word, technology always has played a key role in education, even if the technology began as a rock and a chisel and has since evolved through pen and ink, pencils, slate, chalk, typewriters, and now, computers and digital networks. With each evolving set of technologies the then current educational establish-ment adapted to the change. (A strong argument could even be made that education created the new technologies out of a need to pass on knowledge more effectively). We are now at a simi-lar point in history, although the changes seem to come with greater speed and magnitude. Many have postulated the

changes educational institutions face today are not dissimilar to those the church faced when the printing press moved information out of the hands of the clerics and into the hands of lay people. The Foothill-De Anza District is not immune to technological changes. Indeed, it can be argued that because of its location in the Silicon Valley, our district should be the community college leader in the use of technology.

Statement of Philosophy

We are living in an age of constant and unending change. It is currently estimated that the worldís knowledge base is doubling every 18 months. Students who enter college today with the intent of completing their undergraduate degree four years later will find the factual material they learned as a freshman may very well be obsolete before they graduate. And there is no end to these changes in sight; in fact, it is very conceivable the rate of change and obsolescence will continue to increase for the foreseeable future.

The driving force behind this change and the resulting obsolescence of fact-based knowledge is the rapid advances in all forms of technology whether it is medical, communications, or information technology, to list just a few. Advances in medical technology provide our society with a range of choices from genetic engineering to organ transplants to non-invasive forms of sur-gery. Communications technology is moving rapidly to the point where we can be in touch with anyone at anytime through voice and video. However, at the base of all these changes are the advances in computer chip technology. We are currently measuring generations in computer technology in months rather than years. These advances are allowing our society to create systems in all areas that are more and more complex, requiring workers to be able to understand and operate equipment of a complexity that could not be imagined even a few years ago. Unfortunately, our educational institutions are unable to keep pace with these changes for reasons that are financial, societal, and bureaucratic.

These technological and social forces are demanding educational institutions adapt new forms of teaching and learning. Instead of a fact-based-only curriculum in which students must learn nuggets of information to be recited back on demand, our educational institutions must provide students with a new set of skills. These skills include such abilities as:

- finding and locating relevant information
- discriminating among various data for that which is most relevant to the issue/problem at hand
- synthesizing information into acceptable hypotheses for testing
- judging results of tests as to the appropriateness of conclusions
- effectively communicating these judgments to others
- being open and able to adapt to change throughout oneís lifetime
- possessing the ability and desire to seek lifelong learning opportunities

Higher education, in particular, must find a way to adapt to these new imperatives. Often the last formal education that many individuals receive, it must set the standard of expectations for a lifetime of learning. Looking at our educational institutions, however, we find that the educational processes in most colleges and universities have been relatively untouched for far too long. Based on a model of an agrarian and industrial society, our educational systems are anti-quated

in these times of the information age. Many are still dependent on large-classroom lec-tures with smaller recitation sessions. Classes often are suspended for the summer, leaving facilities under-used and costly. Faculty are expected to assign textbooks for student consump-tion, even though in many fields the texts are outdated almost as soon as they are printed. This emphasis on textbooks in a time of quickening obsolescence of information has given rise to a whole new industry for customized "course packs" and gives students the false message that the only valid information comes in bound paper. These practices are obsolete in these times and do not serve our students well, leaving them ill-prepared to live in todayís and tomorrowís world.

Concurrent with the push of technology are changes in our societal constituency. Historically the United States has been a country of varied economic, ethnic, and cultural makeup. How-ever, it has only been within the last half of the twentieth century that we have been willing to recognize our culture as more than white, male, and Anglo-Saxon. Now we recognize that all cultures bring value to our society, and all ethnic groups must have equal opportunity through education. Unfortunately, this recognition is coming at a time when technology, due to its cost and accessibility, threatens to drive a wider wedge between those groups less well prepared and less fortunate and those who are wealthier and have regular access to the technology. Our educational institutions must take an active and leading role to ensure that such groups are not left behind as we move further into the information age.

Community colleges, however, are uniquely suited to adapt to these new realities. Their multi-dimensional mission of serving the community, serving corporate and technical training needs, serving "traditional" transfer students as well as first-generation often multi-ethnic post-secon-dary students, means that community colleges must stay in closer touch with the needs of their clientele than the four-year institutions concerned with research and publication. For many, community colleges are the technical training grounds to future careers or improved job skills. Our students must have a curriculum and resources to meet their needs and enable them to find adequate jobs. Without such employment they will be unable to have meaningful roles in our community and in our country. Community colleges must meet those needs.

Foothill - De Anza District Role and Its Use of Technology

The Foothill - De Anza Community College District sits at a unique juncture as this confluence of events comes together. As a community college its charge is clear. Located in the heart of Silicon Valley, and as the largest community college district in the Valley, it must strive to meet the widely varied needs of this unique and stimulating community. In this multi-ethnic, highly technologically-oriented community, the district needs to both reflect and lead its constituency. Although its challenges are great, the district has many great resources to help it succeed perhaps primary among these is the vitality and energy of its people.

There is increasing recognition by many in society, and by many in FHDA, that technology will play an escalating role in the educational process. This will occur for reasons beyond those of the capabilities of the technology alone. More and more individuals are choosing for a vari-ety of reasons to opt for distance education. Motivated students who have career obligations, family situations, limited mobility, or who want the mere convenience of learning and working at home are drawn to distance learning. In the past people came to college for information and knowledge; in the future the information will come to them. We need to be prepared for and even

lead this change.

A Proposed Plan of Action

The Districtís Information Infrastructure

GOAL: The districtís primary technology goal should be to provide universal access to information technology resources by giving all faculty, staff, and students the tools and the skills they need to use them effectively.

In a society where access to the Internet (a.k.a. the information superhighway, the national information infrastructure) is becoming increasingly important, the information infrastructure of the district must meet current demands and be capable of handling future needs. At present it can do neither. The basis of the network was first installed in the late 1980ís when the district moved to an Ethernet, broadband coaxial-based network in support of the Districtís administrative computing system. Superimposed on top of that network more connections were made, additional cable was pulled, and AppleTalk networking was added, primarily in response to individual user request. Most of the currently existing network at both colleges runs primarily to administratorsí offices, the division offices, the library, and only very recently, the Advanced Technology Center at De Anza. Only some of the current cable will be sufficient to meet the high-bandwidth needs of our networking future.

First steps have already been taken to meet the current and future networking needs of the district. Bids from consultancy firms to develop the specifications for the voice, video, and data infrastructure were reviewed in March and the contract was awarded by the Board of Trustees in May. In conjunction with district staff the consultant will: (1) develop the specifications for the district network; (2) write the RFP for telecommunications contractors; (3) assist in selecting the winning bid; (4) monitor the installation of the network; and (5) certify that the resultant network meets specifications. It is anticipated that ground will be broken for installation of the network sometime in Fall, 1996.

When complete, the Foothill - De Anza network should provide the following functionality:

- Voice and data to all desktops in the district
- Voice, video, and data, to all classrooms in the district
- Network bandwidth sufficient to provide the anticipated uses of the network for 8 - 10 years
- Delivery of the information to the user at a speed that meets that userís needs regardless of the data type or quantity of information

Infrastructure is more, however, than cables, routers, hubs, and servers. Infrastructure is as much a state of mind as it is hardware and software. Infrastructure includes providing standardized, low-cost site licenses for software. It includes training of staff not only on how to use specific applications but also on how to effectively integrate the technology into the workload to make it more efficient and productive. A technological infrastructure includes providing a single point of reference for help and support so that users are not confused about where to go when problems

arise or help is needed. A good infrastructure provides faculty with support so that they can understand how to integrate technology into the learning process. But most importantly, a good infrastructure is an institutional understanding that in order to use technology effectively and efficiently a holistic approach must be taken. Installing an infrastructure is more than a commitment to purchase cables and hardware it includes the installation of sufficient resources to support effective use of the cable, hardware, and software.

Currently the support for technology in the district is divided three ways. Each college provides its own support structure and the Information Systems and Services group supports both colleges and the district in their administrative and network uses. Because of this tripartite approach to technology there is often much confusion about who is responsible for what services. This confusion often leads to inaction, incomplete service, unnecessary blame-setting, and numerous inefficiencies; in this environment everyone loses. Technology services within the district needs to be redefined. Technology implementation is successful only when all have easy, available, and equal access to technology that works reliably and intuitively and when users have been effectively trained.

Historically there has been only voluntary training to computer users within the district. When computers have been purchased, users often determined their own specifications and how to use the equipment on their own. This leads to great inefficiencies. A recent Gartner Group study (Strategies to Control Distributed Computing's Exploding Costs) found that the total cost of ownership of a microcomputer over a five-year period was over six times the capital cost of the equipment, and most of the costs were in end-user operations (file management, application development, formal learning, casual learning, peer support, etc.). Although the total spending varied by platform (Windows and DOS spending tended to be higher than Macintosh), the costs generally broke down as follows (using Macintosh costs as a standard since it is the primary platform used in the district):

Capital Cost	16%
Labor Costs	
End-user Operations	49%
Technical Support	19%
Administration	16%
TOTAL	100%

Further, the study indicated most of these costs could be reduced through effective training. It costs an enterprise two to three times as much for an untrained user to learn how to use the technology than it does to train a single user to the same (or better) level. The Gartner Group states, however, for every $1 cut in user support and training from the technology budget, $2 are spent in "underground support."

Are people in the district able to positively state who they would call when they encounter problems with technology? Do they call Information Systems and Services at the district or someone local to their campus? Who do they call for advice about what hardware or software to use? What if their office is moving and they need an additional phone line? In short, there should be a single contact point on campus for employees to call for support with technology, yet there

seems to be little unanimity of opinion about who to call for any of these questions.

Like staffing, hardware, and networking, establishing software standards for use within the district is an essential ingredient of the infrastructure. Standard-izing on software provides economies of scale, efficiencies in training and support, and uniformity in file formats for easy sharing of data and docu-ments. To date, the only software standard and site licensed software in place is Microsoft Office and even then individuals in the district are caught between somewhat incompatible versions due to insufficient staffing to support a universal installation of the latest version. The district needs to set standards and provide the support for acquiring, installing, maintaining, and training users on the software selected.

Our infrastructure plans also need to account for the diverse needs of the district. Workstation selection, placement, and installation must account for the needs of our physically-challenged individuals and comply with federal ADA (Americans with Disabilities Act) standards. Similarly, our installation of technology must also take into account potential health risks that may occur as a result of extended use of the equipment. To reduce employee fatigue, prevent repetitive motion disorders (e.g. carpal tunnel syndrome), and improve worker efficiency, the design and placement of furniture and work areas need to be considered.

We therefore recommend:

The district move forward immediately to install a district-wide network. The network should provide the capability for voice and data to every faculty, administrative, and staff desktop, as well as voice, video, and data to all classrooms (including the capability for student open- and discipline-specific computer labs). This network should provide sufficient bandwidth to cover our anticipated needs for the next 8 to 10 years.

A single unified technology support organization be created and staffed sufficiently to provide services and technology to all district employees and students. This organization would be responsible for providing and maintaining voice, video, and data technology. It should include, at a minimum, the following functionalities: support and maintenance of an effective network infrastructure; maintenance of quality telephone services; coordination of efforts to standardize and acquire hardware and software; and responsibilities for operating and sustaining district-wide computing resources, maintaining security of the data, reliability of the equipment, and effective use of the technology.

The creation and staffing of a help desk on each campus to support faculty and staff with the use of technology. This help desk will allow users to have a single, unified point of contact for technical support.

The creation and staffing of technology training support staff who will provide regular training (1) on licensed desktop applications; (2) to new hires in the district; (3) to faculty who wish to incorporate technology into their classes; (4) for new technology and applications as they become available for employee use.

District-wide site licenses be acquired for basic desktop productivity software. This

includes, but is not limited to, word processing, spreadsheets, presentation software, email, Internet browsers, graphics and database applications. There is also a need for utility software licenses such as virus protectors and screen savers.

The placement of computer technology in every faculty office, on each staff work desk, and every administrative office. Each workstation should be connected to the district-wide network, and all faculty, staff, and administrative workstations should be multimedia-capable. Users will be expected to complete certain training or demonstrate the expected technical competence before receiving a workstation.

Supporting Faculty Use of Technology

GOAL: The districtís primary technology goal for faculty should be to provide training, support, and access to appropriate technology resources for teaching and learning activities.

The potential for instructional uses of technology are as plentiful and varied as the disciplines in the college. Effective use of networked, interactive, digital media for learning can come in many flavors: tutorials, simulations, hypermedia, collaborative writing, experiments, teleconferencing, virtual realities, and assistive technologies are just a few methods which can be used to improve teaching and learning for a diverse group of students.

Many faculty at most institutions, not only FHDA, have little experience in using technology for learning, nor should they be expected to, given the relative ages of both faculty and the technology. Such inexperience implies the faculty will need extensive support in instructional use of technology if it is to be used effectively. This support should take many forms.

There is a growing number of educational applications available with exciting new software becoming available almost daily. The installed base of quality, commercially available software that matches the objectives of many of our classes, however, is relatively small. Therefore, we anticipate that our faculty will need support in:

- envisioning how to use technology as an instructional support tool
- evaluation and selection of effective commercial applications
- training on use of specific materials
- design and creation of effective instructional digital applications

We also recognize that individual use of technology will vary widely. Some (within most organizations this number is usually 15% or less) will be avid users, often referred to as the innovators or early adopters, eager to try out and explore the latest technological development. There are many more, however, who have less interest in technology or are too busy with other things to take the time needed to master its instructional use. Normally they are the great majority of an organization and usually are ready and willing to become technologically competent when it is necessary or compelling to do so. Finally, there are individuals who are either averse or hostile to technology. This group is usually small in number but often requires large amounts of technical support and/or training.

This is not to point out something that seems obvious upon reflection, but rather to indicate that a variety of strategies are required to bring each group along to move the district forward in using administrative and instructional technology effectively and efficiently. The innovators and early adopters require little technical support, but if supported in other ways (primarily financially), they can blaze the trails, test various techniques for relatively low cost (before it becomes much costlier later), establish a basis for moving forward, and bring recognition to the district. The majority of users, who will adopt technology a little later, however, will change the institution the most and will cause the greatest efficiencies and improvements. For these individuals the full support structure will need to be in place and operational. The small group who are averse or hostile to technology also serve an important role. They can act as the leavening agent to ensure that in the potential zeal to innovate with technology, we donít stray too far from our mission to provide a quality education to all whether technology is necessary or not. This group will remind us that technology does not answer all questions nor is it necessary to everything that we do.

Part-time faculty play a significant role in the success of FHDA. We need to ensure that they have sufficient access to technology so they are equal partners in its use. Possible methods for this include the designation of workstations and technology labs for use by part-time faculty, the inclusion of part-time faculty as plans are more fully developed, and ensuring their eligibility for such programs as equipment loans, software site-licensing, and discount programs for hardware or Internet access.

To ensure successful use of technology in teaching and learning, it is important that the district:

- Train faculty in basic computer skills such as operating systems, word processing, spreadsheet, database, and presentation software, and network principles
- Train faculty in the use of technology to enhance instruction
- Establish mechanisms for peer to peer communication and training
- Support faculty in the creation of multimedia and Web-based instructional materials
- Enable faculty to use technology with students by establishing workstations in all classrooms which may include: VCR, laser disc player, projection system, a voice, video, and data network connection, and a multimedia-capable computer.
- Provide, at a minimum, on campus Internet and email access for all faculty, staff, administrators, and students.

We therefore recommend:

The creation and staffing of an instructional technology support organization which will assist faculty in using technology in teaching and learning, including the provision of the following functionality: instructional design, multimedia creation, web page support, instructional software evaluation and licensing, support for acquisition and maintenance of equipment for classroom use.

The implementation of a faculty development program which will provide ongoing training and professional development activities for the use of technology.

The provision of instructor workstations in a number of networked classrooms containing multimedia workstations with suitable projection devices as aids to

traditional instruction.

The continuation and enhancement of the interest-free loans for faculty and staff to purchase their own computer.

The creation of a program to support "technology champions" who will take the lead in the creation and use of applications within the district. This program should allow for failure as much as it expects success. Individual programs or people supported in this way will be encouraged to explore new technology, risking some failures, but will also be expected to attempt extraordinary successes with new uses of technology.

The creation of an academic software library containing instructional applications which faculty may explore and evaluate for potential use in their classes.

The provision of a network connection and a computer workstation in every full-time faculty office with some provision for part-time faculty access.

The provision of low- or no-cost off-campus access to the Internet for all who choose to take advantage of it. This may take the form of discounted service from an Internet Service Provider or the establishment and maintenance of district modem banks for access.

Supporting Administrative Uses of Technology

GOAL: The districtís primary technology goal for administrators and staff should be to provide secure, reliable, timely data in a format that can be easily accessed and analyzed by the individual administrator or staff member.

Administrative users need assurance that their data is secure, reliable, and accessible upon demand. Until recently, administrative technology was so complex that it required a specially trained staff to maintain and program the equipment. The hardware that supported administrative computing previously was large and required specially designed rooms to control the environment. Staff and administrators who needed data were dependent on a programming staff to provide them with "screens" or green-bar printouts that contained the information. If the information was not found on either of these formats, special programming was often required to provide that data. Any further processing of the data for deeper analysis by the user was difficult and often required re-keying of the data by the user. This scenario is often referred to as a "host-terminal environment."

The capabilities of technology in administrative services are changing as are the demands of the administrative user. Microcomputers are allowing users to create, maintain, edit, and process data. This permits a much greater efficiency in data manipulation. The data processing tools and the data reside much closer to users. Access to this technology empowers administrators to make their own judgments about what information to access and how to process it. This technology, often referred to as a "client/server environment," provides quicker and more informed decisions

by administrators. It allows for creative ways to manipulate the data ways in which it may not have been possible to do in a host/terminal environment thus leading to new insights, and ideally, better management decisions.

Client/server technology can allow considerable flexibility in data entry and presentation. Let us cite just a couple of examples that might clarify the benefits of moving to this technology. Currently students who want to know their status within the college must rely on the results of data culled from our current host/terminal system. Because of its design, and relative "user-unfriendliness," our system requires students who want a "degree audit" (that is, they want to know how many courses they have successfully completed toward their degree or toward transfer, or how many courses are needed in what areas) must make appointments with counselors for this information. A counselor meets with the student and goes through several different screens on their VAX terminal to give the information to the student. Because of the esoteric design of the software, counselors need training on how to find this information and students are unable to access it themselves. If the student wants to take the information with them, they must either copy the relevant data off of the screen or request a print-out. Unfortunately, the resulting document is often indecipherable by the student because of the small size of the font (resulting from the decision to have the data all fit on one page) and the esoteric terms used. A client/server technology for a degree audit application, if configured properly in a networked environment, would empower individual students with the ability to garner this information from any computer on campus or even from their home if they had the necessary equipment and connectivity. Giving students this capability would substantially free up counselors from the routine work of passing on information to the tasks they are intended to perform counseling and advising. Students also could access relevant admissions and records information, i.e. transcripts, grades, or schedules, thereby freeing up admissions and records staff.

In the Human Resources area, much effort is spent in the collection and correction of personnel data. Individual employee benefits frequently change as their home/family lives change individuals have children, get married, are divorced, sign up for a different health plan, decide to create a deferred-tax retirement plan, or retire, to name just a few. As a result, their personnel records and benefit information needs to be updated. Currently these changes are made by the individual filling out paper forms and submitting them to HR, who then transcribes the data onto our current host/terminal system. This process is slow and tedious and could result in data entry errors. In the recommended networked environment, individuals at their own workstations would be able to make these changes immediately and could ensure their records were accurate and up to date.

To summarize, students who need to know their current status could easily retrieve data in a form understandable to them, while employees who have had changes in their personal life could easily update their own benefit information. These two examples illustrate the efficiencies, better service, and more reliable data that can result from a conversion to client/server technology. Similar improvements could occur in financial aid, EOPS, registration, and many other areas.

Within FHDA there are still many vestiges of the host-terminal environment which once served us well but now seems to prevent us from entering and retrieving data in a usable, timely manner. We need to move forward as quickly as possible to a client/server environment.

We therefore recommend:

The district complete upgrade of its current host based administrative system. While it is not a client/server system, the upgrade will add needed functionality to the existing system while also preserving the districtís ability to receive maintenance from SCT. This will also provide the industry time to more fully develop and test higher ed client/server administrative applications ñ keeping the district from the "bleeding" edge.

Once the upgrades are completed, the district should form a task-force consisting of administrative users from both colleges to create an RFP for new administrative (HRS/FRS/SIS) systems.

Upon the selection of appropriate vendors, implementation teams should be formed composed of functional end-users and technical support staff. These teams will be charged with moving the district promptly toward a client/server technology.

The district should begin now its investment in technologies that exploit the World Wide Web. Interfaces such as Netscape, Microsoftís Explorer, etc. will be the dominant development platform for administrative applications in the near future.

Supporting Student Use of Technology

GOAL: The districtís primary technology goal for students should be to provide equal and easy access to technology for all students so their learning, their interactions with others, and their quests for information are easier and more efficient to obtain.

Students should be the primary beneficiaries of our technology plan. After all, they are the raison díêtre for the district and are our primary customers. We exist for the purpose of promoting learning and intellectual growth in our students. Therefore, our technology plan should serve their needs and goals. As we implement technology throughout the district we should be guided by a few simple questions; "Does this implementation make it easier for our students to learn?" "Does this implementation make it easier for students to obtain information they need?" "Does this implementation assist students in receiving the best possible service from the district?" These questions should have affirmative answers regardless of the technology implemented, administrative or academic.

As we move to a completely networked environment, student access to relevant data should increase proportionally. Those students who wish to should be able to register on-line, access data about their program of studies, retrieve their grades, send email to other students, faculty or administrators, sign up for financial aid, research a term paper, locate a book in the library, access multimedia lessons, or do on-line research where ever they are located, on campus or off. Technology is breaking down the barriers to information of these types, and with its implementation, there should be few boundaries imposed by the institution on student learning

Additionally, we need to recognize not all of our students will have computer access at home or work. And if they do, the capabilities of their equipment vary widely. Although there are a number of computer labs at each college, they tend to be dedicated-use labs, designed specifically for a particular discipline or course of study. Students who do not have access to technology off campus are at a distinct disadvantage compared to those who do. They are not able to do word-processed papers, research work on the Internet, or take advantage of supplemental multimedia enrichment for their courses. Equal access to technology for our students, therefore, becomes of critical importance. There are a variety of means by which we can support equity in this area, and we should explore several options. Some possibilities include the following: the establishment of open access computer labs providing basic services such as word processing, access to the library system, and Internet access; discounted purchase plans for computer hardware and software; and discounted access to the Internet.

We therefore recommend:

The creation of properly staffed, open access student computing labs with general purpose software on each campus. These labs will enable students to access the Internet and library resources for research and perform word processing tasks. These labs should be open as many days and hours as possible and should not be used for instruction or by specific departments or disciplines.

Providing widespread access for students to pertinent data. This may include the creation and placement of information kiosks throughout the district or allowing student access to their data from any instructional or open lab. The services available might include registration, the library system, degree audit capability, or instructional servers on the network.

The provision of low- or no-cost off-campus access to the Internet for all who choose to take advantage of it. This may take the form of discounted service from an Internet Service Provider (ISP) or the establishment and maintenance of district modem banks.

Issues Related to the Technology

Providing the Technology

With limited resources the District cannot afford to support each and every technology standard that may be available to business and industry. The support for such a policy would be too expensive, both in terms of the variety of technical support skills required to provide an adequate level of expertise, as well as the financial cost in purchasing differing technologies. Such a policy also fragments the districtís purchasing power and removes economies of scale garnered by standardization. At the same time, the colleges must meet the instructional needs of students. This requires a careful balancing act between what the district establishes as a standard and what individual divisions may require.

Standardizing on hardware and software also promotes a sense of community among users. It allows individuals to speak with a common language about how to do certain processes and at the same time allows innovative uses to be quickly dispersed through the college and/or district. In an environment characterized by many differing standards, file and data sharing becomes complicated and inefficient. Users are often distracted by the unnecessary time it takes to learn how to share data and files on different platforms.

It is important within a limited budget that the standards supported represent widely accepted industry standards. Betting limited funds on fringe technologies in the hopes they will become an industry standard is too great a risk to undertake. Buying inexpensive "clone" technology for a lower price often proves costlier in the long run. It generally is better to purchase brand name technology even though it appears to be costlier initially. High maintenance technology should be avoided as a standard if other workable options exist. (An example of a "high maintenance technology would be one with a known history of requiring specialized support staff to keep it operational.)

The decision of what technologies to standardize should be guided by several criteria:

- ease of use
- ease of support (amount of training required, ease of installation, networkability)
- ability to meet the needs of the widest number of users
- overall cost of the technology throughout its expected lifetime, including training, technical support, and expected lifetime (not just the initial cost of the equipment)
- current standards commonly and currently in use within the District
- ability to easily support multimedia (audio, video, and images) in addition to standard text and numeric data
- support for standard network protocols

It is essential that we find the most cost effective method for the acquisition of technology. It is difficult to maintain currency in these times of rapid technology obsolescence and to acquire technology that meets the needs of individuals within the incorporated standards.

A key problem facing all educational institutions is to prevent their technology infrastructure from becoming obsolete within limited budget constraints. Many schools are forced to rely on one-time funds to purchase computers and are unable to budget annually for the large expenditures.

We have explored lease and purchase options and found interesting results. An email message was sent to all Chief Instructional Officers of California community colleges asking questions related to their use of lease agreements to acquire technology. Although only 11 responded, we found that none used leasing as a method to provide technology to their employees and students. However, it appeared that few had fully investigated it as an option. We have discussed lease arrangements with some vendors and found that there are very definite advantages to leasing. First, lease agreements can be negotiated that allow for turnover in equipment every three years or so, thus negating possible obsolescence of owned technology. Second, by entering into a lease agreement, the institution creates a budget line that becomes a part of the operating annual budget, thus reducing reliance on one-time money for hardware acquisition. Third, lease agreements can be negotiated that allow more hardware acquisition for the money expended,

often at a factor of two to three times the amount available under a purchase.

Whether FHDA decides to lease or purchase, deployment of technology is still of critical concern. It is very likely we will not be able to supply everyone with computers simultaneously. Difficult choices will have to be made about priority of need and assignment of new technology. It is clear that certain areas will always need to stay current with technology in order to offer viable service to students and staff. Those curricular areas that teach the use of technology (such as CIS, CAD, and computer graphics courses) need to stay on, or close to, the cutting edge to attract and provide students with the education and necessary skills to find viable jobs. The District technology support groups need to be adequately equipped with all forms of technology to provide optimal service to employees and students. However, specifying groups such as these does not imply that others cannot remain current or that a process of recycling the technology through the organization cannot be managed. Other institutions have successful policies for acquiring new technology for "cutting edge" programs each year and recycling older equipment to other areas as the new equipment arrives. By incorporating a similar policy, we can ensure those who need state-of-the-art technology have it while others will still have very current hardware.

Another issue is that of coordinating hardware acquisition within the district. Divisions on each campus currently purchase computers as needed. By setting equipment standards and coordinating acquisition, the district should be able to capitalize on economies of scale. An acquisition procedure should be implemented to save money and to enable us to negotiate maintenance agreements. In addition, a coordinated acquisition program will assist in implementing equipment replacement.

Acquiring more equipment necessitates more maintenance and support. Currently, both campuses have Apple repair facilities but as more users purchase Windows and potentially other systems, the need for training of staff becomes important. As the number of computers increase the number of technical support staff and the computer repair budget must increase proportionally. In order to meet usersí expected level of service, and make efficient use of the technology, it is imperative that such support staff be increased.

We therefore recommend:

The district set standards for hardware, operating systems, network protocols, desktop productivity software, etc. that are industry standards and which can be effectively supported by the staff of the district. These standards should be adhered to by all support staff and administrators, with the likelihood that most all faculty would as well. Exceptions to the standard would only be allowed when there is a clear and demonstrable need for instructional reasons. The standard should be reviewed periodically to ensure compatibility with current and future technology.

Technology acquisition and replenishment be budgeted annually. The goal for technology budgeting should be the inclusion of regular acquisition of technology so no computer in use is older than three years.

The District explore the possibility of lease arrangements that allow for

replenishment of newer technology.

Acquisition of hardware be coordinated to ensure standards are maintained and the district is receiving the best value for its money.

As computers are deployed, employees must take training courses on or before receiving equipment. This training will include the skills needed to operate their computer in desktop productivity software such as word processing, spreadsheets, databases, graphics, email, and network-related services.

The Board move to urge the state legislature to allow student technology fees to be assessed as a method of supporting the continuing expenses of technology initiatives.

The Role of the Libraries and Technology

A primary area of technological attention in todayís colleges and universities is the library. As collections grow larger it has become necessary to automate the processes of libraries and store information about their collections in massive databases. Library automation systems have been developed to provide immediate information about a collection and to provide users with various services formerly only done manually. For example, library patrons can now use the World Wide Web from anywhere in the world to access hundreds of library collections. However, because users can see only the collection, not individual books, this capability will not eliminate the need for purchasing books. An inkling of what is to come, however, is available through subscription services such as Magazine Index and Info Access which allow users to retrieve various full text periodical and journal articles.

Our students should be able to gain information about the librariesí collections from anywhere. To assist in that endeavor, both campus libraries recently purchased the SIRSI library automation system, which will be operational by September, 1996. SIRSI uses a client/server architecture so that part of the software is installed on a database server and part of the software resides on a personal computer. Because SIRSI conforms to industry standards it will allow users the ability to access many other library databases over the Internet using a World Wide Web browser such as Netscape Navigator. Also, through SIRSIís WEBCAT software, each collegeís library catalog will be an interactive, on-line public access catalog available on the World Wide Web. SIRSI will offer both full-text and relational databases and the ability to perform and teach professional and advanced search techniques to reduce information overload. Dial-up modem and telnet access will allow users without a World Wide Web browser to access either collegeís library from their homes.

In addition to the SIRSI Library Automation System, professional on-line searching by librarians is also available through DIALOG which offers over 400 full-text and citation based databases. Information Accessí Enhanced Academic Index will be available to students and faculty directly for full-text and citation-based searching through the on-line Public Access Catalog. It is intended that we expand the number of full-text databases being offered directly to patrons. Microforms complement the citation-based index with the respective full-text article if available

from the publisher. The libraries also offer several CD-ROM products including ERIC, Books in Print, Global Explorer and Library Literature.

We therefore recommend:

> SIRSI software should be installed as widely as possible on student, faculty, and staff workstations to allow for universal access to the system.

Distance Learning

It is clear that as technology becomes more sophisticated and more widespread in homes and offices throughout the Valley and indeed throughout the world, more of our student clientele will request that our curriculum be delivered to them at their locations, rather than at ours. We also need to recognize that other colleges and institutions will be able to use technology to deliver instruction to our students if we do not meet their needs. In recognition of this, the Chancellor created the Distance Learning Task Force to develop a plan for delivering instruction and learning at a distance. This Task Force is currently meeting and discussing instructional issues related to distance learning. Five work groups have been formed to discuss and make recommendations on five issues: quality of instruction, faculty needs, structural and organizational support, student support, and research and development. Each work group will identify components related to the issue, prioritize the issues, identify activities to complete the issue, and state a timeline to complete the activities.

Many of the identified issues link to this technology plan. Therefore, it is important that the District Technology Committee work along with the Distance Learning Committee to insure the faculty instructional technology needs will be met in the infrastructure and network project.

It is important to point out that the recommendations in this document do not account for the needs and recommendations that will be developed by the Distance Learning Task Force. Because the Task Force is still in the developmental process this section will be continually updated as Distance Learning moves forward.

We therefore recommend:

> The Distance Learning Task Force and the District Technology Committee work closely together to ensure that instructional technology needs are met throughout the district.

The TV Centers and Technology

There is no doubt that television, computers, and network technology are blending together. Digital video, now only in its infancy will eventually be the norm. It is more a matter of how

soon, not whether, it will become a standard. Donald Tapscott, in his recent book, The Digital Economy: Promise and Peril in the Age of Networked Intelligence provides an example of a rock group distributing information about the groupís concert schedule on the Internet via the MTV World-Wide Web site. MTV also provides audio and video interviews with various band members via its web site. He goes on to point out that the capability already exists for the group to distribute its music, in CD-quality sound, via the web, and could if it chooses, bypass MTV altogether and give fans video of their latest releases on demand. What happens to MTV, he asks, or its CD publisher, Warner Brothers Records when the group decides it can go directly to its fans on its own? A similar question could be asked of FHDA. What could happen to FHDA when other institutions go directly to students using this technology?

Clearly, FHDA needs to find ways to use digital video. But how should FHDA incorporate the new digital video standard into its operation? To answer this question, it is important to understand that digital video offers a number of advantages that the current standard, analog video, cannot provide. First, digital video can be stored easily, provided there is sufficient capacity, and delivered on demand the instant it is needed, provided there are fast enough servers and sufficient bandwidth on the network. Second, it is much more capable of interaction than analog video. It is inherently a two-way medium, allowing for non-linear action under control of the user. Not only can digital video be selected for play back when and where the user wants to view it, but it also can be interactive within itself. With video becoming capable of virtual reality experiences (for an example, see Apple Computerís QuickTime VR) users can control the "action" as it is happening; deciding, for example, to follow a different path of action than the linear one prescribed by traditional analog video. Third, digital video can be transported using the same network infrastructure as other forms of digital data, allowing it to be transmitted point-to-point, from one individual to another, rather than mass distributed only from one single source as is the case with analog video.

What do the advantages of digital video mean to FHDA? First, we will find that more and more individuals, corporations, libraries, and museums will develop and distribute digital video via the network. This distribution will open up a new universe of resources for use by our faculty and students "on demand" (when they want it, where they want it). Second, it will allow for fairly widespread use of interactive videoconferencing, both internal to our district and external to other schools, colleges, and universities, as well as to corporations and individuals for distance learning. Faculty and students will be able to interact with each other directly no matter where in the world they are located (for an example, see Cornell Universityís CU-SeeMe application or Appleís QuickTime Conferencing).

What happens to our current TV Centers under this scenario? Not much immediately. It will take some time before analog video and its primary distribution mechanism, cable TV, disappear. Essentially the reason for the delay will be the time it takes for the digital infrastructure to completely replace societyís current analog video system. Estimates for that eventuality range up to a decade or longer. Even then, FHDA will need a location for the creation and distribution of its digital productions. The TV Centers, with their skilled staff, studios and equipment, will be well suited to move FHDA into the digital era.

In recent years we have not taken full advantage of the potential that exists within our TV Centers, particularly with the satellite uplink capabilities for teleconferences (at De Anza) and our ITFS capabilities to narrowcast training and academic courses directly into the companies

within the Valley. Other than the commercial TV stations, and Hewlett-Packard, De Anza has the only satellite uplink capabilities in the area. With that unique capability FHDA has a strategic advantage over any number of others throughout the world. For example, we could partner with local technology companies to broadcast a series of satellite teleconferences concerning advanced technology, issues surrounding its use, or integrating it into education or the workplace. Such a series could be a "win" for all involved and bring FHDA world-wide recognition. Our ITFS capabilities allow us to beam courses or training directly into a company who requests them, making us more responsive to their needs. In short there is much more we could be doing even now.

We therefore recommend:

The district ensure that the network infrastructure provide sufficient bandwidth to support digital video capabilities throughout the district.

The TV Centers within the district begin the conversion to digital video capabilities.

Training sessions be held to assist faculty and administrators in understanding and using the capabilities of digital video and videoconferencing.

The district use its strategic location in Silicon Valley and its satellite uplink capabilities to partner with local companies on a series of teleconferences on technology and issues surrounding technology use.

The Telephone System

FHDA has maintained its own digital phone system for a number of years. Many people refer to our telephone system as "the Audix system," when Audix is actually the voice messaging software that runs on a PC connected to our telephone switch. It is important to make this distinction because the near term issues surrounding our phone system and services are basically twofold. Within the next three years or so we likely will be facing the necessity of replacing our phone switch.

First, and probably most noticeable to many users, is the Audix system. Although fairly sophisticated, allowing for many features common to most messaging systems, Audix has had capacity problems for some time. These problems have resulted in many users getting regular reminder messages from the system asking them to delete their voice mail messages to free up their voice mailbox. Recently, the Board, however, approved purchase of hardware that should increase storage capacity to reduce the amount of time we are running at capacity. Second, both colleges are facing shortages in the number of available digital and analog lines at various locations on campus.

These two problems can be solved with short-term fixes, and as mentioned above the Audix situation is already being improved. However, within the next three years our phone switch will approach the end of its workable life and FHDA will need to replace the entire system.

We therefore recommend:

The district take necessary steps to ensure the short-term viability of the phone system, including the installation of additional hardware and software. These steps, however, should be constantly weighed in light of the relatively imminent need for a new telephone system in the next three years.

The district be aware of, and therefore begin planning and budgeting for, the eventual replacement of the current phone system in the next three to five years.

The Role of the World-Wide Web

Much media attention has been focused on the World-Wide Web, primarily covering marketing and commercial uses of the Internet,. However, there are many ways in which this technology can, and will, impact education and the business of providing education. Many people within FHDA recognize the value in this technology, although they are not always certain how it can be applied to their work. Obviously it can be a research tool to assist students and staff who need information. With its increasingly powerful multimedia capabilities, it also can be used in support of instruction in many disciplines. Third, it can be an effective tool for marketing by providing useful information to potential and current students. It is these applications that are attracting attention within the district.

It is our belief, however, that the WWW technology can have a major effect in the district beyond the above examples. It appears that software tools used in exploring the World-Wide Web (known as "browsers") are evolving into good client software for a wide range of data access and manipulation. Therefore, much effort is now underway in many companies to explore and expand this technology to create "Intranet" as opposed to "Internet" uses. In this concept the WWW technology is used as a tool to provide a variety of internal information to employees. Within FHDA this technology, because of its easy point-and-click interface, can serve a variety of "intranet" purposes. Board policies and procedures can be available on-line; job postings and descriptions can be posted and made searchable; and weekly staff news can be published. Directories of phone numbers and email, as well as office locations and hours can be posted, each searchable. And because it is easy to update, these can always be kept current. WWW technology allows for queries against on-line databases, provided the "back-end" database engine allows it. Thus, we could provide tools to students, staff, and faculty that allow for acquisition and analysis of research and institutional data. Although it could be argued that much of this information is already "on-line," it is not always in a format that is easily and widely accessible, nor is it widely known that it is available in this way. As technology becomes more widely available via our own "Intranet," our work can become more efficient and information will become more widely available.

Creating an intranet that is usable and functional requires a different mentality and culture than most previous major software conversions. Because of the accessibility of the technology and the relative ease of creation, web "pages" are being created by many people with only a modicum of training. As an indication of this phenomenon we, acting as Deans of Technology, have received

numerous requests from faculty and staff who have already created their own web pages with very little training or support and want them connected to the college pages. Both the De Anza and Foothill web sites were created by faculty and staff who taught themselves how to use the technology.

The preceding discussion is not meant to imply that the conversion from a host/terminal to a client/server environment can be done with non-professionals, but rather to indicate that untrained or relatively little-trained users are now beginning to have the power, through advances in technology, to create useful applications for themselves. This indicates the beginning of a paradigm shift in the way information technology operations have traditionally been run. In the future, we still can expect a central computing organization will continue to exist, but the services it performs will be different. Rather than an emphasis on programming "screens" for end users, it is possible that such an organization will focus instead on assisting users in finding or creating their own tools for data manipulation, along with its traditional functions of maintaining secure, reliable, and accurate data.

We therefore recommend:

> The creation of sufficient positions dedicated to managing and maintaining the district and collegesí WWW use as well as staying current with the WWW technology. This staff also would have responsibility for determining the overall architecture of the districtís web presence.
>
> The district move forward to create intranet applications for internal use to improve communications and work efficiency.

Policies Related to Technology

As technology plays a larger role in our working lives its use frequently raises questions about current policies and practice. During our investigations we immediately recognized that the district and the colleges have few policies regarding the appropriate use of technology. Even as we worked on this document we were confronted often with problems for which there was no formal standing policy. These issues often touched upon the very fabric of what an academic institution is about. For example: Are postings on the Internet protected by freedom of expression and academic freedom if they appear to be damaging to the institution or slanderous of individuals? Are searches of the Internet a legitimate and sufficient method of research? What are acceptable use policies for the technology? How can we assist our students in understanding appropriate use of the technology? These are just a few of the many questions raised by the use of technology in any academic institution. In many cases these questions raise legal issues that may only be resolved in a court of law. The districtís interest will be better served if it has established guidelines and procedures in place when the questions are first raised rather than later when confronted with legal action.

The ISS department has proposed guidelines for appropriate use of technology and is in the process of circulating them for review. These are an important first step toward establishing a set of district-wide policies.

We therefore recommend:

The District Technology Committee create a subcommittee on policy whose purpose should be to recommend policies and procedures pertaining to the use of technology. The policies created by this group should be viewed as malleable and open to revisions as the technology changes. Therefore the policy subcommittee should be an ongoing entity whose lifetime does not expire simply upon the publication of a set of guidelines.

The Board adopt the guidelines established by the subcommittee upon endorsement by the District Technology Committee in order to further educate our students, faculty, and staff about appropriate use and to protect the district against liability.

Providing Services

Currently many users of computer technology in the district are frustrated because they are not being served as promptly as they would like. This statement should not be taken as a reflection upon the individuals within the districtís Information Systems and Services (ISS) department, or those who work in the collegeís Audiovisual (AV) Departments, but rather as an indicator that there are not enough services being provided. Our classified technology staff should be commended for the amount of work they do and they do their best to maintain currency in their areas. However, the demand for services far outstrips the capability of these departments to meet it; there simply are not enough positions within the district to do all that is asked of them.

There also is confusion among many in the district about who provides what technology service. And if adequate service is not provided few individuals know who to turn to for satisfaction. Primarily this confusion is due to the distributed nature of the technology service groups and the fact that there is no clear single line of authority. ISS views itself as a support organization for administrative computing and networks; and expects the colleges to provide other support. (At De Anza, however, there is an exception; ISS expects the college to manage some aspects of the network within the Advanced Technology Center.) However, as we move into a more networked environment even the technology will blur this distinction beyond clear conception. As an indication of this trend, one prominent computer manufacturer claims in its advertising that "the network is the computer."

As a result, the AV departments have taken on more responsibility for computer technology, including consultation for specifications before purchase, diagnosis and repair of equipment, and the installation of software and hardware, among other responsibilities. This changing role reflects the districtís history of dealing with technology via evolution, rather than planning. With the total amount of the budget spent on technology increasing each year, and with it likely to continue to increase for the foreseeable future, an evolutionary process for providing service can not succeed. More staffing, for example, does not evolve; it is created. Deliberate, thoughtful action must be taken to ensure that, as we add technology, we also provide appropriate services.

Centralization vs. Decentralization

What services should be centralized? What should be left to the colleges? These are questions that plague virtually all multiple campus community college districts. A way to begin dealing with the questions is to recognize that there are reasons for dividing services between a central organization and the campuses. Although the technology is moving from a centralized (terminal-host) environment to a more distributed (client-server) environment, there is still sense in centralizing certain services. For example, there are certain uniformities of service and efficiencies that accrue to centralized technology support. There are also certain services that should only be provided in a centralized form; for example, networking, telephones, and certain administrative applications. At the same time, there are other technologies that make sense only in a distributed way (creation of word-processed documents, individualized databases, departmental spreadsheets, WWW page development, instructional computing, etc.)

A Gartner Group study on the costs of technology indicated that 60 percent of an enterpriseís total information technology spending is outside of the central information technology (IT) organization. However, it is important to examine which IT functions are better served in a centralized system and which would be more appropriately done in a distributed method. The Gartner Group suggests that shared resources should be centrally managed, while nonshared resources should be managed locally. They state:

> *This is rooted in our notion of what "infrastructure" means. Our view is that infrastructure is the underlying foundation upon which a community relies. The key phrase is "upon which a community relies." For example, managing a server that is used for development by one particular department can be assigned to and/or located within that department. A server that provides services to many departments (e.g., a mail server) should be managed by a central organization.*
>
> *The enterpriseís strategic direction (i.e., the architecture and standards) can also be thought of as a shared resource. In that case, supporting strategic desktop systems might be delivered by central organizations, while support for nonstrategic platforms is delivered locally. The assignment of "ownership" and often location, can then be based on the "community" it supports.*

Another way to determine centralization versus decentralization is to determine how capital-intensive or labor-intensive are the services provided. The more capital-intensive services would likely be centralized to maximize on economies of scale, while those that are labor-intensive would be distributed to concentrate on providing service closer to the "client." For example, the maintenance of large workgroup servers that provide data to the district at large should be centralized while the maintenance of desktop computers would be distributed.

The Gartner Group also states that the ultimate strategy may be to recognize the solution will change with time, because each strategy solves a different problem. It may be that the centralization/decentralization debate is actually a euphemism for the debate between controlling costs (centralization) and providing/allowing flexibility (decentralization). Because each strategy, over time, creates the opposite problem (centralization stifles creativity and decentralization drives up costs), the solution for FHDA may be to find the correct balance between controlling costs and optimizing creativity, and continually reevaluate the

organizational structure. However, we should recognize that an IT organizationís perspective often is controlling costs while users desire more flexibility.

Based on this discussion, our suggestion is that the following list be used as a guideline in determining the distinctions. We understand that much discussion and debate should be focused on this issue in order to best determine the final structure for any information technology support group

Services, technology, or information functions should reside at the

	DISTRICT	College
	When...	When...
A.	Technology - (1) Technology is such that it can only be supported in a centralized fashion	(2) Technology is such that it can not or should not be centralized (e.g. word processing)
B.	Economics - (1) Efficiencies (cost reduction) result from centralization of service	(2) Technology is used more effectively and creatively if distributed
	(3) Contractual obligations dictate a district commitment to perform function/service	(4) Contract (grant) awarded to College, Division, Department, or Faculty.
C.	Operations - (1) The information functions performed are so critical to the District, or are so complex, that a professional support staff is required to perform them	(2) The information functions performed are critical to the success of a College, Division, or Department.
D.	Information - (1) The data is of universal need within the District; or when it is confidential and needs to be secure	(2) The data is specific to the operation of a College, Division, or Department
E.	Expertise - (1) Expertise and understanding of information needs resides at the District level	(2) Expertise and understanding of information needs resides in the College, Division, or Department
F.	Historical (1) Historical dynamics dictate a district implementation	(2) Historical dynamics dictate a distributed implementation
	Strategic direction	(2) The technology resources are not critical to the operation or mission of the

G.	(1) The technology resources are central to the operation or mission of the District	District

Using the table above we can then map certain kinds of functions onto a continuum of centralized service, distributed service, and a mix of the two. For example, the installation of the network, its maintenance and security, would be centralized because the functions it provides are so complex that a professional support staff is required (C1) and the network is central to the operation of the district (G1). Thus, the following assignments could be made:

Centralized services would cover

- Telecommunications [A1] [G1]
- Maintenance of the central phone switch [A1] [G1]
- Network design, installation, maintenance, and security [C1] [G1]
- Site licenses for desktop productivity software [B1]
- Administrative applications and databases (HRS, FRS, SIS) [D1] [G1]
- Setting of technology standards [B1] [B3] [D1]
- Negotiating district-wide acquisition of standardized equipment and software [B1] [B3] [D1]
- Maintenance of email services and accounts [B1] [E1] [G1]
- Web Page Support for district administrative offices [E1] [G1]

Distributed services would cover

- Site licenses for specialized/instructional applications, unless two campuses or departments agree to a joint purchase [E2]
- Libraries [F2]
- Computer sales to individuals [G2]
- TV Centers (Faculty development and support, distance learning, Public Access) [D2] [B4]

Mixed services (central management, distributed support)would cover

- Equipment maintenance [B1] [E2]
- Equipment purchase and set up [B1] [E2]
- Network support [C1]
- Installation of phones in offices [B1] [G2]
- User consultation for purchase [B1] [E2]
- Trouble calls/Help Desk [B1] [E2]
- Lab Technical Support (Staffing) [B1] [E2]
- Faculty and Staff Development/Training [B1] [E2]
- Web Page Development [A2] [E2]
- Web page styles for District content [D1] [E1]
- Instructional Computing Development [C1] [E2]
- Distance Learning [B1] [E2]

We therefore recommend:

The creation of a clearly defined technology service and support organization whose mission would be to provide quality service uniformly to all users and technologies within the district.

The District Technology Committee determine the exact organizational mix of centralized and distributed services for the technology service organization, taking into account the issues discussed herein.

Structure of the Support Organization

There are a variety of organizational structures that have been used by colleges and universities across the country for their Information Technology support organization. Perhaps the most commonly used model is to have the technology support split between academic and administra-tive functions, each independent of the other and each reporting to a different admin-istrative leader. In many places this organizational structure simply evolved along with technology, rather than having been created with any forethought or planning. Because of admin-istrative needs, and possibly because administrators had control of the pursestrings, ad-ministrative computing applications often preceded academic use of the technology. Such implementations were required to keep the institution running by maintaining vital functions such as payroll, accounting, student records, and human resources. Academic computing often came later and at four-year institutions this use of technology often focused on research rather than teaching and learning. Because of the (then) relatively large amount of data that was being manipulated, administrative computers were often quite massive, requiring large, specially equipped rooms and a specially trained staff to support them. Centralization of services and security of data and equipment was paramount.

On the other hand, academic uses were often seen as peripheral to the daily operation of the institution, even though very important to the individuals involved as well as to the research standing of the college or university. Often academic technology was distributed among the departments with support and maintenance occurring locally or possibly "contracted" to the centralized administrative computing organization via a budget transfer or charge back system. Computers used in academic areas were often less powerful than the administrative mainframe and, if networked at all, often were on a much smaller network (or LAN). Distributed technolo-gies unconnected to other services characterized academic computing. Historically, academic computing generally received much less institutional funding support than administra-tive, relying generally on grants and donations for creation and survival. Institutional philoso-phy was often to see academic computing as the poorer step-sibling, often on its own, or often administered, if at all, by a non-technology-literate administrator. The following table may serve as an example.

Historic Characteristics of Administrative and Academic Computing

Characteristic	Administrative	Academic
Type of Technology	Large mainframes, now moving to high-powered servers	Smaller computers (mini-computers first, then desktop microcomputers and workstations)
Organization	Centralized	Distributed
Data Types	Text, numerical (gradually graphics)	Text, line art initially, now multimedia
Amount of Data	Large, and getting larger	Small until recently, now verging on massive with networked multimedia
Support Staff and Management	Relatively large number, professionally trained	Individuals, learned on their own
Network	Always	Only recently
Computing Metaphor	Host/terminal until recently, moving to client server	Stand-alone until recently, moving to client server

FHDA has not been much different than other institutions. Academic uses of technology generally have not been supported in any organized fashion. For example, there has not been any individual or group who has been charged with the responsibility of integrating technology into the curriculum. Funding for technology has primarily been directed toward administrative applications. Organizationally the two functions have been split with colleges providing their own academic use support and the district office of Information Systems and Services providing administrative applications and networking support. But, like other institutions, FHDA has evolved into this position. For example, the AV departments at each college primarily provided traditional analog audiovisual support in the past, but recently have taken over the responsibility of computer repairs.

Current technology is blending these two previously disparate ways of viewing technology. Multimedia and networking technologies have advanced to the point where the processor cycles and network bandwidth needs of academic computing may now exceed that of administrative computing; and if it doesnít exceed it now, it certainly will in the future. Further, the type of technology employed by each side is becoming increasingly similar high-end workstations, client-server technology, high bandwidth networks are essential to both operations. Finally, the number of academic users, and the concurrent number of academic computers is much larger than that on the administrative side.

At present the major computing support group, ISS, reports to the Director of Business Services at the district. This is a reporting structure common to many educational institutions, and because of the historical necessity to provide administrative computing services this has been a natural location for computing services to be placed. However, the increasing prevalence of academic uses for technology, as described above, calls for a different organizational structure, with a single administrator responsible for all technology decision-making in the district. Such an organizational structure would provide several benefits to the district and the colleges. First, it

would prevent the academic and administrative computing sides from competing as much for resources. Historically, the competition for resources has benefited administrative needs; in the future, trends indicate that academic uses could take precedence. By placing all of technology under a single administrative structure, the needs and resources can be balanced. Second, this structure also would ensure that technology support becomes a service organization for all constituents within FHDA. All users of technology are potential clients of a technology support organization. However, when that organization reports ultimately to one side or the other, whether it be academic or administrative, it actually is reporting to one of its customers an inherent contradiction. Third, an organizational structure as suggested can provide FHDA with a competitive advantage. Information technology will soon be the lifeblood of the institution; it very nearly is so now. Already FHDA would have to shut down if many of the information technology functions were to cease operation. In the future, our technological capabilities will not serve only the role of keeping the district operating; it may be our primary strategic advantage. In order to prepare adequately for this future we need to have a single, unified vision provided through high-level leadership.

Therefore, it is important that the technology support organization be centrally administered and this organization be placed within the administrative structure as an independent group reporting directly to the Chancellor.

We therefore recommend:

> The creation of a high-level administrative position reporting directly to the Chancellor and responsible for technology planning and implementation for all levels and areas. This position would be the Chief Information Officer (CIO) in the district and the primary manager of the technology support organization.

Staffing

Successful technology implementation cannot occur without an adequate support staff. FHDA is currently severely understaffed for support of its technology effort. There is little support for instructional use of technology or staff training about technology. Many areas in which technology could be applied within the district are not often suggested by technology staff because there are no personnel to support any new efforts and many requests are turned down or arenít even made for the same reason.

We strongly believe that the district must create positions or redirect staffing so that appropriate support can be provided for its technology initiatives. Without it, our effort will surely fail. Even gradations of support will add to the frustration level of users. It cannot be overstressed how important it is to have staff readily available to support users as equipment is installed. Equipment should not be acquired unless there is staff available to support it.

It has been suggested by some that part of the staffing could be handled via release-time for faculty, casual employees, or the catch-all phrase, "additional duties as assigned." It is our belief the district can not afford to rely on these solutions to provide the staffing that is needed. First, a failure to provide an adequate base line of full-time professional staff will result in inadequate service for users and technology. Second, the size of the investment in technology that the

district has already made demands a professional staff to ensure its upkeep, efficient and appropriate use, and reliable service. Third, technology changes so rapidly and its support and maintenance is so complex that service can not be adequately handled by part-time non-professional staff.

During the course of gathering information for this document we have examined the technology staffing needs of the district. We have listened to many individuals who have expressed their needs, desires, and frustrations related to staffing in this area. In response, we have put together the following staffing matrix based on our current and future needs. Although this document recommends a new organizational structure, this matrix reflects the current organization for clarity of understanding. The structure of the proposed positions in this matrix is not meant to weaken in any way our recommendation for a revised organizational structure. We also recognize that the quantity of positions we are recommending will be shocking to many; but we hope that upon reasoned reflection most individuals will agree that to reach our goals for the future we will need this quantity and type of positions. The district and the colleges will need to go through a careful, and very likely soul-wrenching, process of self-examination to determine how committed they are to technology in order to fund what are already overdue needs.

We will not make specific recommendations at this time about the organizational structure of the Technology Support Organization (TSO) except that we hope it will be formed soon. It is our belief that the structure of this organization needs to proceed through the governance process, but will reasonable haste. A TSO as we suggest here would provide immediate payback to the district by providing training, more efficient service, expanded services, and clearer lines of accountability. The District Technology Committee must work quickly to create the TSO as soon as possible.

The following matrix indicates new positions or additional staff needed in addition to our current technology support staff. These new positions would be combined with current technology support positions to create the new technology support organization.

NOTES:

Grade levels are not indicated for all positions. Some will have to be defined along with the creation of the position, others may need to be defined as part of a reclassification process.

Approximate salaries are not included because we believe a separate salary schedule needs to be implemented for technology-related positions because of competition with similar corporate positions in the Valley.

The number of some positions need to be viewed as dynamic. That is, as more technology is implemented more positions in certain categories will need to be added.

This matrix does not include any instructional aides to support labs. Currently these positions report to divisions, not to technology. As more computer labs are brought on-line, more aides will be needed to support them.

This matrix presupposes any re-organization. The matrix is set up roughly along current organizational lines. The District Technology Committee may recommend a re-organization of all technology support.

We recognize that the total number of positions may seem excessive, but we strongly believe this is a minimum of what is required to provide adequate services to support the technology effort for the foreseeable future.

The timeline is based on when we would begin advertising the positions, not filling them. Therefore the suggested timeline may seem accelerated, but we recognize that it could take at least several months to fill a position after it is advertised so we are trying to project when the positions will be filled to match with when we expect the technology to "come on-line." Positions need to be filled before, or no later than, when a particular technology becomes operational. For example, we have placed Technology Trainers in the "Immediate" column because it will take time to define the position, advertise it, interview applicants, make an offer, and get people on board. Then the new trainers will need time to develop curriculum, schedule and set up labs, promote the sessions, and deliver the training. All of this may take 10-12 months, at least. In the meantime, the infrastructure will be in the process of installation and demand for training will increase. (Other new positions in the Immediate column need lead time, also, but perhaps not the amount of time that the trainers would need. We use trainers as an extreme example to make the point.) This is not to preclude that we also have several positions ranked as "Immediate" which we really needed some time ago. In several cases, these positions are intended to make up for ones lost (or at least, "not gained") because of prior fiscal troubles.

We therefore recommend:

> The district move forward immediately to create positions and hire the staff necessary to support technology within FHDA. These staff would be organized into the technology support organization within the district.

Philosophy of an Information Technology Support Organization

It is important that the mission and philosophy of a Technical Support Organization (TSO) be in place before it is staffed. Obviously it, and its staff, must be fully committed to providing quality service to its clientele (students, faculty, administrators and staff). It must recognize the unique needs, mission, and calendar of an educational institution, knowing that activities that contribute to student learning have priority. Staff employed in the TSO should have the following as their goals:

> *All technology users are guaranteed a minimal level of service that will be publicly stated and widely disseminated. The minimal level of service should include a steady and reliable connection to the network via a machine that is equivalent to current standards in the industry.*
>
> *The technology should become transparent to the user or the user should be supported in a way that makes the technology transparent.*

Although centrally managed, the TSO must be distributed in providing services. This means that the technicians who do the work, whether it is hardware, software, or networking should be assigned or located on the campuses. It is important that such techs be intimately familiar with workstations, configurations, and networks specific to the location. Providing service consistently to one location leads to greater efficiency and better understanding of both the clientís needs and the technology used to meet those needs. Also, technology itself is becoming increasingly distributed. It almost dictates a distributed labor force to maintain it properly. Therefore the TSO must have as its mandate to think and act in a distributed fashion.

We therefore recommend:

> The primary goals of the Technology Support Organization should be to provide prompt service that is reliable and courteous to all employees and students in the district, to make technology transparent to the user, and to recognize that the best service is that which is provided closest to the customer.

Implementation

Approximate Costs

A technology implementation as we suggest here will be costly. The extent of the costs is not inconsequential. It will require significant resolution and soul-searching within the district. However, successful implementation of technology is crucial to the future of the Foothill - De Anza District as our clientele and the society around us become increasingly sophisticated with technology.

Obviously there will be a need for some creative financing of a plan of this magnitude. As discussed earlier, leasing equipment can provide benefits that should be fully explored. Assessing a technology fee, with approval of the legislature, would almost immediately make this plan viable; a fee in the magnitude of $1 per credit could generate approximately $750,000 annually for the district.

Shown below are "ballpark" estimates of the cost of implementing a comprehensive integrated technology plan. The figures are meant only as estimates to provide key decision-makers with approximate figures needed for targeting financial goals. Readers of this document should not consider these figures as anything other than rough calculations.

The costs are divided into three key areas ñ staffing, equipment acquisition, and infrastructure installation. However, they should not be seen, nor should they be funded, as separate discrete elements. Each area is interlocked with the others and funding should be based on moving each area forward in unison. Because of the need for adequate staffing concurrent with hardware acquisition and infrastructure implementation, partial implementation of all areas simultaneously is preferable to full implementation of each area independent of the others.

We recognize that the district will be unable to fully fund the technology plan in one budget year

ñ even over a number of years. However, because of the need to provide adequate staffing along with hardware acquisition and because of the need to provide a network infrastructure with the hardware, we believe it will be likely that a phased approach to implementation will be necessary. A phased approach means there will be times when some locations and some people will be "technologically rich" while others in the district will be "technologically poor." In other words, for a period of time there may be "haves" and "have-nots." However, if we universally recognize these dichotomies will exist, and are a necessary stage to full implementation, and if we can guarantee budgeting to keep the project on target over a number of years, then we will ultimately reach our goal.

Several assumptions rise out of these statements. One assumes all of the district can agree that there will be a period of time, however long or short, when there exists a "have/have not" culture and in order for the plan to be successful the "have-nots" will agree with, and abide by, this state of affairs. A second assumes that we can create a budgeting plan that keeps us moving forward without delays in any stage. Few things could be more detrimental to a comprehensive plan than to find that the district has encountered a budgeting problem midway through implementation, leaving some areas rich with technology while others are impoverished with no timeline for acquiring their share.

Staffing costs

Because we believe adequate professional staffing is the cornerstone to the success of any technology implementation, we are presenting those costs first. We have broken the costs into three phases: Phase One ñ what is needed immediately; Phase Two ñ what will be needed within 6 to 12 months of the beginning of implementation; and Phase Three ñ what will be needed as our faculty become more sophisticated with technology and request more services. The column labeled "# of positions" is an aggregate of the staffing positions outlined in the staffing matrix above (see page 27), with the inclusion of "management positions." The average salaries listed are based on the current classification scheme; the actual cost may be higher if a separate salary schedule for technology positions is adopted as we recommend. It is important to note that these are positions in addition to the current staff who support technology, these are additional costs, not total costs for technology support.

	Type of position & current level	# of positions	Approximate Annual On-going cost
Phase One	Tech support (60)	10	
	Staff development (48)	3	
	Web support (60)	3	
	Chief Information Officer (006)	1	
	Instructional Support Mgr. (003)	1	
	TV Supervisor (65)	1	
	Clerical (46)	3	

	Subtotals	**20**	**$1,375,000**
Phase Two	Instructional support*	2	
	Instructional support (52)	2	
	Staff development (52)	2	
	Clerical support (46) ◄	1	
	Subtotals	7	**$375,000**
Phase Three	Instructional support (60)	4	
	Subtotals	4	**$250,000**
	TOTALS:	31	**$2,000,000**

*** These positions, Instructional Designers, could (and probably should) be non-teaching faculty positions**

Ÿ These positions, Computer Graphics Designers, would be classified positions

It should be noted this estimate for staffing costs does not include the costs of providing them with appropriate equipment, furniture, office supplies, and software necessary to do their jobs. The estimate is based only on salary and benefits.

Hardware Costs

A second area of costs pertains to hardware acquisition. In the past, like most other educational institutions, equipment was purchased as individual administrators needed it and had funds. Often one-time monies were used for such acquisition, which has resulted in obsolete equipment consuming desktops and a wide diversity of equipment which is difficult to support and maintain. Except for enterprising departments or administrative initiatives, many in the district are dependent on one-time monies to acquire needed equipment. This has led to inequity and inefficiency. The district needs to redirect its purchasing patterns and budget annually for the costs associated with technology. Without a planned annual operating budget to support equipment acquisition, the district will move forward with technology very slowly and haphazardly.

Much of the hardware in the district is aged and out of date. In the district for example, there are currently about 2,700 computers, of which up to 60% are more than three years old. We choose three years because at this point the continuing cost of owning and operating a computer begin to rise significantly. In the course of a computerís usable lifetime this is the point when maintenance costs begin to increase and its utility with current software begins to decline. Possibly over 40% of the equipment on both campuses is older than five years, making it nearly unusable in todayís world.

Our costs are estimates based on certain assumptions. Because we had to start with a model to use as a metric for discussion, we are assuming an ideal hardware configuration; that is, to gain currency in todayís computing environment we need to replace all computers that will be more than two years old during the next 12 months. Although some computers may need more or less

power, we are assuming an average workstation price of $3,000. Even though some may find price high we use it for several reasons. First, the tendency by many is to compare prices we pay with what is advertised in the media for consumer equipment. However, average consumer prices are for equipment used at home and are not designed for heavy office or lab use. Home computers are often made to less durable standards with fewer features built in and are generally less expensive. Second, because of the needs of the district we have factored in the cost of other capabilities, such as Ethernet for networking. And third, we are trying to account for the overhead costs of set up and software installation even though these costs should be absorbed in other ways. It is our estimate that FHDA would need to acquire approximately 2,000 desktop computers for replacement of antiquated systems, for new systems for those employees who do not currently have readily available access, and for student labs that are already identified as likely to be installed during the next 12 months.

Also, it should be noted that we are not factoring in any return that may occur as a result of declaring old equipment surplus and selling it. At this point, we have no way of estimating if any revenue might be generated to offset our acquisition costs for new equipment.

In essence our cost model is assuming the highest cost scenario in order to present a picture of what the top end costs might be. As we implement the plan, total costs may decline, although there is no guarantee.

The tables below illustrate an array of financing alternatives ranging from issuing Certificates of Participation in a lease/purchase format to an operating lease with a residual buyout option after three years of service. All acquisition pricing models are based on a lease arrangement for reasons stated earlier in this document.

Fortunately the cost of funds is quite low in todayís marketplace. This favorable business environment lends itself well to leveraging the acquisition of equipment in concert with an assetís useful life. Specifically, the technology plan can be phased in and concurrently funded over a three- year period. After the third year of this program, future annual lease payments will finance new equipment and allow for the retirement of old/obsolete equipment. For instance, the payment in year four will fund the replacement of equipment acquired in year one, the lease payment in year five will replace year two, and so on.

The original estimate of 2,000 machines needed at a cost of $3,000 each indicates an outlay of approximately $6 million in hardware, software, and peripherals over a span of three years to fully fund the Districtís comprehensive plan. For comparative purposes, however, the estimate has been scaled down to illustrate the relative costs at $3 and $4.5 million. Since the spending pattern spans three years, the annual equipment cost in the tables reflects about a third of the total required outlay.

Based on the investigations of Ron Galatolo in the District Office, we have several different cost scenarios:

Apple - Municipal Capital Lease with $1 Purchase Option:

List Price of	Annual Payment	Total 3 Year	Total Cost with

Equipment		Appropriation	Purchase Option
$1,000,000	$356,324	$1,068,972	$1,068,973
$1,500,000	$534,486	$1,603,458	$1,603,459
$2,000,000	$712,648	$2,137,944	$2,137,945

Apple - Operating Lease with Purchase Option @ Å 10% Residual:

List Price of Equipment	Annual Payment	Total 3 Year Appropriation	Total Cost with Purchase Option
$ 1,000,000	$ 341,522	$ 1,024,566	$ 1,124,566
$1,500,000	$ 512,328	$ 1,536,984	$ 1,686,984
$2,000,000	$ 683,105	$ 2,049,315	$ 2,249,315

Raucher Pierce - "Bank Qualified" Capital Lease @ Various Funding Levels:

List Price of Equipment	Annual Payment	Total 3 Year Appropriation	Total Cost with Purchase Option
$ 1,000,000	$ 369,619	$ 1,108,857	$ 1,108,857
$ 1,500,000	$ 554,429	$ 1,663,287	$ 1,663,287
$ 2,200,000	$ 813,162	$ 2,439,486	$ 2,439,486

Piper Jaffray - Certificate of Participation @ $2,200,000 per annum:

List Price of Equipment	Annual Payment	Total 3 Year Appropriation	Total Cost with Purchase Option
$ 2,200,000	$ 825,855	$ 2,477,565	$ 2,477,565

It is important to understand that a lease purchase allows FHDA to purchase the equipment at the end of the lease term for $1. In contrast, an operating lease requires a return of the equipment after three years of use unless we elect to buy out the "residual" value of the equipment which has been calculated in the above scenario at around 10% of its original purchase price. For example, if FHDA elects to buy out the equipment leased in year one and if its original purchase price was approximately $2,000,000, the purchase option would be approximately $200,000.

Regarding the Certificate of Participation, the interest rate includes the cost of issuance and other related expenses. Similar to a lease purchase, FHDA will own the equipment at the end of the three-year lease term.

The tables above demonstrate annual appropriations based on current market conditions and the total payment over a three-year period. These rates will likely change between now and when this plan is implemented. Therefore, it is important to first address how much the District can

commit on an annual ongoing basis and then scale up or down the technology plan.

Infrastructure Costs

Some of the infrastructure costs have already been incurred. At the May 6, 1996, Board meeting the District Trustees approved a $100,000 contract with Comsul, Inc. In that contract, Comsul agreed to design the network infrastructure, develop its specifications, develop the specs into a bid for contract, assist our staff in evaluating the bids and selecting a contractor, manage the ensuing project, and certify that the installation met specified standards. Comsul will also provide FHDA with a phased plan for staging in the network with an estimate of the overall costs for each stage. At the time of this printing, Comsul was in the process of assessing FHDAís needs prior to designing the network. As a result, the figures for the infrastructure are not complete.

We therefore recommend:

> The district embark upon a phased implementation plan which incorporates planned budgeting for staffing, equipment, and infrastructure. This plan should ensure these three key elements are present proportionally in each phase.

Proposed Calendar

There is much work to be done before all of the recommendations can be implemented. Action on some of the recommendations should be started immediately because we are deficient in those areas. Some action should start very soon thereafter, in anticipation of future needs or to prepare for implementations that we know will occur. And some can wait for a period of time for a variety of reasons. But it is our belief that whatever the pace, although we would like that pace to be quick, there is an order in which it should occur.

For example, a widespread reliable network infrastructure needs to be in place as a baseline service for all users. Also, certain staff should be in place before some infrastructure or hardware installation takes place. To help in understanding that a specified sequence of action should occur, we have included the following chart illustrating the proposed steps in implementation. Note that dates are not a part of the chart; it is intended to show the chronological order, not timelines or deadlines.

First a few notes of explanation. Because we are uncertain what Comsul will recommend for phasing in the network the "network design and installation" section of the chronology should be viewed as a model of what may occur. We have included four stages to the network although there may be more or less. That number is meant simply to indicate that there may be multiple stages of installation of the network. Also, the entire chronology should be read left-to-right with the understanding that lines indicate actions that must follow one upon the other. That is, if two boxes are connected, the left box must be completed before the right box can occur. Thus, electronics technician positions need to be created and filled before desktop equipment can be acquired and installed. Finally, the chronology is meant to be illustrative; there are actually many

more subtasks that could have been included on the chronology, but for simplicity of understanding were not included.

Conclusions

Next steps

Upon completion, revision, and acceptance of this document there are some steps that need to move forward immediately. Foremost is the creation of a district-wide Technology Committee whose role it will be to oversee the implementation of the plan. This committee should have technologically savvy representative members from the major constituency groups in the district, including faculty, administrators, and classified staff from each of the colleges and the district office. We recommend that the Chancellor appoint members of the committee and it be large enough to be representative, yet small enough to be able to move quickly to make decisions in a timely fashion and to be responsive to user needs and changes in technology. We believe there should be no more than 12 - 15 members, although the committee may choose to create a number of working subcommittees which would consist of other individuals to deal with specific issues.

The primary tasks of the Committee would be to:

- Review this document, revise as appropriate, and move to implement the plan
- Determine a specific calendar for implementation
- Set standards for technology (e.g., computer platforms to support, software to license, etc.)
- Develop an equipment acquisition and replacement program
- Determine the organizational structure of the Technology Support Organization, including numbers of positions needed lines of authority.
- Work to ensure Board ratification of an acceptable use policy for technology
- Review current intellectual property policy in regard to technology use; modify as necessary and assure Board ratification
- Serve as the primary governance group on technology, taking input from the larger community and establishing policy as appropriate

This committee should be created immediately to begin work with the fall term.

Summary List of Recommendations

The district move forward immediately to install a district-wide network. The network should provide the capability for voice and data to every faculty, administrative, and staff desktop, as well as voice, video, and data to all classrooms (including the capability for student open- and discipline-specific computer labs). This network should provide sufficient bandwidth to cover our anticipated needs for the next 8 to 10 years.

A single unified technology support organization be created and staffed sufficiently to provide services and technology to all district employees and students. This organization would be responsible for providing and maintaining voice, video, and data technology. It should include, at a minimum, the following functionalities: support and maintenance of an effective network infrastructure; maintenance of quality telephone services; coordination of efforts to standardize and acquire hardware and software; and responsibilities for operating and sustaining district-wide computing resources, maintaining security of the data, reliability of the equipment, and effective use of the technology.

The creation and staffing of a help desk on each campus to support faculty and staff with the use of technology. This help desk will allow users to have a single, unified point of contact for technical support.

The creation and staffing of technology training support staff who will provide regular training (1) on licensed desktop applications; (2) to new hires in the district; (3) to faculty who wish to incorporate technology into their classes; (4) for new technology and applications as they become available for employee use.

District-wide site licenses be acquired for basic desktop productivity software. This includes, but is not limited to, word processing, spreadsheets, presentation software, email, Internet browsers, graphics and database applications. There is also a need for utility software licenses such as virus protectors and screen savers.

The placement of computer technology in every faculty office, on each staff work desk, and every administrative office. Each workstation should be connected to the district-wide network, and all faculty, staff, and administrative workstations should be multimedia-capable. Users will be expected to complete certain training or demonstrate the expected technical competence before receiving a workstation.

The creation and staffing of an instructional technology support organization which will assist faculty in using technology in teaching and learning, including the provision of the following functionality: instructional design, multimedia creation, web page support, instructional software evaluation and licensing, support for acquisition and maintenance of equipment for classroom use.

The implementation of a faculty development program which will provide ongoing training and professional development activities for the use of technology.

The provision of instructor workstations in a number of networked classrooms containing multimedia workstations with suitable projection devices as aids to traditional instruction.

The continuation and enhancement of the interest-free loans for faculty and staff to purchase their own computer.

The creation of a program to support "technology champions" who will take the lead in the creation and use of applications within the district. This program should allow

for failure as much as it expects success. Individual programs or people supported in this way will be encouraged to explore new technology, risking some failures, but will also be expected to attempt extraordinary successes with new uses of technology.

The creation of an academic software library containing instructional applications which faculty may explore and evaluate for potential use in their classes.

The provision of a network connection and a computer workstation in every full-time faculty office with some provision for part-time faculty access.

The provision of low- or no-cost off-campus access to the Internet for all who choose to take advantage of it. This may take the form of discounted service from an Internet Service Provider or the establishment and maintenance of district modem banks for access.

The district complete upgrade of its current host based administrative system. While it is not a client/server system, the upgrade will add needed functionality to the existing system while also preserving the districtís ability to receive maintenance from SCT. This will also provide the industry time to more fully develop and test higher ed client/server administrative applications ñ keeping the district from the "bleeding" edge.

Once the upgrades are completed, the district should form a task-force consisting of administrative users from both colleges to create an RFP for new administrative (HRS/FRS/SIS) systems.

Upon the selection of appropriate vendors, implementation teams should be formed composed of functional end-users and technical support staff. These teams will be charged with moving the district promptly toward a client/server technology.

The district should begin now its investment in technologies that exploit the World Wide Web. Interfaces such as Netscape, Microsoftís Explorer, etc. will be the dominant development platform for administrative applications in the near future.

The creation of properly staffed, open access student computing labs with general purpose software on each campus. These labs will enable students to access the Internet and library resources for research and perform word processing tasks. These labs should be open as many days and hours as possible and should not be used for instruction or by specific departments or disciplines.

Providing widespread access for students to pertinent data. This may include the creation and placement of information kiosks throughout the district or allowing student access to their data from any instructional or open lab. The services available might include registration, the library system, degree audit capability, or instructional servers on the network.

The provision of low- or no-cost off-campus access to the Internet for all who

choose to take advantage of it. This may take the form of discounted service from an Internet Service Provider (ISP) or the establishment and maintenance of district modem banks.

The district set standards for hardware, operating systems, network protocols, desktop productivity software, etc. that are industry standards and which can be effectively supported by the staff of the district. These standards should be adhered to by all support staff and administrators, with the likelihood that most all faculty would as well. Exceptions to the standard would only be allowed when there is a clear and demonstrable need for instructional reasons. The standard should be reviewed periodically to ensure compatibility with current and future technology.

Technology acquisition and replenishment be budgeted annually. The goal for technology budgeting should be the inclusion of regular acquisition of technology so no computer in use is older than three years.

The District explore the possibility of lease arrangements that allow for replenishment of newer technology.

Acquisition of hardware be coordinated to ensure standards are maintained and the district is receiving the best value for its money.

As computers are deployed, employees must take training courses on or before receiving equipment. This training will include the skills needed to operate their computer in desktop productivity software such as word processing, spreadsheets, databases, graphics, email, and network-related services.

The Board move to urge the state legislature to allow student technology fees to be assessed as a method of supporting the continuing expenses of technology initiatives.

SIRSI software should be installed as widely as possible on student, faculty, and staff workstations to allow for universal access to the system.

The Distance Learning Task Force and the District Technology Committee work closely together to ensure that instructional technology needs are met throughout the district.

The district ensure that the network infrastructure provide sufficient bandwidth to support digital video capabilities throughout the district.

The TV Centers within the district begin the conversion to digital video capabilities.

Training sessions be held to assist faculty and administrators in understanding and using the capabilities of digital video and videoconferencing.

The district use its strategic location in Silicon Valley and its satellite uplink

capabilities to partner with local companies on a series of teleconferences on technology and issues surrounding technology use.

The district take necessary steps to ensure the short-term viability of the phone system, including the installation of additional hardware and software. These steps, however, should be constantly weighed in light of the relatively imminent need for a new telephone system in the next three years.

The district be aware of, and therefore begin planning and budgeting for, the eventual replacement of the current phone system in the next three to five years.

The creation of sufficient positions dedicated to managing and maintaining the district and collegesí WWW use as well as staying current with the WWW technology. This staff also would have responsibility for determining the overall architecture of the districtís web presence.

The district move forward to create intranet applications for internal use to improve communications and work efficiency.

The District Technology Committee create a subcommittee on policy whose purpose should be to recommend policies and procedures pertaining to the use of technology. The policies created by this group should be viewed as malleable and open to revisions as the technology changes. Therefore the policy subcommittee should be an ongoing entity whose lifetime does not expire simply upon the publication of a set of guidelines.

The Board adopt the guidelines established by the subcommittee upon endorsement by the District Technology Committee in order to further educate our students, faculty, and staff about appropriate use and to protect the district against liability.

The creation of a clearly defined technology service and support organization whose mission would be to provide quality service uniformly to all users and technologies within the district.

The District Technology Committee determine the exact organizational mix of centralized and distributed services for the technology service organization, taking into account the issues discussed herein.

The creation of a high-level administrative position reporting directly to the Chancellor and responsible for technology planning and implementation for all levels and areas. This position would be the Chief Information Officer (CIO) in the district and the primary manager of the technology support organization.

The district move forward immediately to create positions and hire the staff necessary to support technology within FHDA. These staff would be organized into the technology support organization within the district.

The primary goals of the Technology Support Organization should be to provide prompt service that is reliable and courteous to all employees and students in the district, to make technology transparent to the user, and to recognize that the best service is that which is provided closest to the customer.

The district embark upon a phased implementation plan which incorporates planned budgeting for staffing, equipment, and infrastructure. This plan should ensure these three key elements are present proportionally in each phase.

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